MAY 1955

MARKETING ACTIVITIES

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
Washington 25, D.C.

IN THIS ISSUE

MARKETING ACTIVITIES

Vol. 18 No. 5

Address all inquiries to:
J. Grant Lyons, Editor,
MARKETING ACTIVITIES,
U. S. Department of Agriculture
Washington 25, D. C.

A monthly publication of the United States Department of Agriculture, Washington, D. C. The printing of this publication has been approved by the Director of the Bureau of the Budget (March 24, 1953). Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at a subscription price of $1.50 a year (domestic), $2.00 a year (foreign), payable by check or money order. Single copies are 15 cents each.

Cutting Labor Costs In Grocery Warehouses

By John C. Bouma

Potential savings of one-fifth of the labor now required in the operation of modern wholesale grocery warehouses have been discovered as the result of recent marketing research by the U. S. Department of Agriculture and members of that industry.

Through the use of improved work methods developed during the study, better utilization of equipment, and balanced work crews, the man-hours required for receiving goods, assembling orders, checking them, and loading delivery trucks was reduced an average of 13 percent in 6 modern, one-floor warehouses participating in the study. An additional saving of 8 percent in man-hours is expected to result after new equipment is installed and in operation in these warehouses. This would mean a total labor saving of 21 percent in the warehousing operation of the firms.

These results were obtained in a research project conducted by the Transportation and Facilities Branch, Agricultural Marketing Service, USDA, in cooperation with the National-American Wholesale Grocers' Association and the 6 wholesalers whose operation were studied intensively.

Labor accounts for more than 50 percent of wholesale grocery warehousing costs. Methods of increasing labor productivity, naturally, are a major concern of warehouse management. They are also important as an economic factor in food marketing costs.

Savings in Warehouse Receiving

Increased labor productivity was achieved in receiving groceries by separating the palletizing operation from the storing operation. In 3 of the firms studied, the palletizing crew spent an average of 62 percent of their time waiting for the forklift truck. In 2 of the same firms the number of men palletizing merchandise was reduced 33 percent, from 6 to 4, by separating these operations and providing the palletizing crews with pallet jacks, 4-wheel trucks or skids. Figure 1, next page, shows the use of a semilive skid for moving a pallet of merchandise.

Productivity of one man working alone in palletizing groceries and moving the loaded pallet out of the car was nearly 38 percent greater per man-hour than for a 2-man team. Economies can be gained by using one man to unload cars provided the car can remain at the dock long enough for one man to unload it and provided one man is not required to unload such heavy merchandise as green coffee, or bulk flour and sugar.

Figure 1.--Use of semilive skid and pallet jack to move merchandise.

Order Assembly

The assembly of orders of individual retailers required nearly 40 percent of warehouse man-hours. Materials-handling equipment for this work in modern warehouses includes the 4-wheel warehouse truck pushed by hand, the tow line, small gasoline and electric tractors, remote-controlled order-filler tractors, and conveyor lines.

Effective use of the 4-wheel, hand-pushed warehouse truck requires the use of a short selection line in order to keep travel time of the order filler to a minimum. With the use of a small gasoline or electric tractor to tow 4-wheel warehouse trucks, travel time is reduced 42 percent over hand pushing when order fillers travel 1,500 feet in the assembly of a 30-case order. An additional reduction of more than 20 percent in travel time is accomplished when remote-controlled units are used with a small electric tractor. Perimeter tow lines are used effectively in large warehouses to move assembled orders to the shipping dock, and thereby reduce travel time of order fillers and the confusion caused by order fillers continually bringing assembled orders to the shipping dock.

In addition to materials-handling equipment, stock arrangement and order size have a direct influence on the productivity of order fillers. Order filler productivity with the slot system and tow tractors averaged 48 cases per hour on orders of one to 10 cases in size, while they averaged 159 cases per hour on orders of 75 to 100 cases in size. The productivity was much greater with the short selection line and conveyor system than with the slot system and tow tractors, especially in the assembly of small orders. On orders of one to 10 cases in size, order filler production averaged more than twice as much, or 127 cases per hour, with the short assembly conveyor system as they did with the slot system and tow tractors.

Many delay factors have an influence on order filler productivity. The man-hour cost of these factors becomes significant when these delays are timed and multiplied by the frequency of occurrence. Common causes of excessive order filler delay are: (1) Waiting for selector trucks; (2) waiting for forklifts to lower inaccessible merchandise or bring merchandise from reserve storage; (3) waiting because of aisle blockage; (4) waiting for orders to be processed; (5) waiting for selector trucks; (6) waiting for a work assignment; and (7) time lost in correcting order filler errors. Order filler productivity can be increased by determining the cause of the delay and correcting it.

Reducing Checking Costs

The productivity of a 2-man team in checking orders by item descrip-

tion and piece count was increased almost 38 percent, from 502 to 692 cases per man-hour, when the first half of the items on the invoice were placed on one side of the 4-wheel selector truck and the other half were placed on the other side by order selectors. One man checked orders arranged on the selector truck at 1,208 cases per man-hour, 75 percent more than each man in a 2-man team. Added economies can be gained in checking orders through: (1) Eliminating duplicated order checks and (2) sample checking.

Figure 2.--Warehouse conveyor lines come together with extension into truck, rear center.

Loading Delivery Trucks

In loading delivery trucks one man handled approximately a third more cases per man-hour than 2 men working as a team. When merchandise is placed on conveyors during order selection in the warehouse, greater productivity of truck loaders is obtained when the conveyor is extended into the delivery truck. Figure 2 shows the merging of conveyor lines in a warehouse with an extension into the delivery truck. This method eliminates pushing 4-wheel trucks into and out of the delivery truck.

Two methods of separating retailer orders on delivery trucks were observed during the study. One method was to divide each order on the truck with cotton cord netting of approximately 2-inch mesh. Another was to mark each case with the stop number; for example, 2, 3, 4, etc. leaving the first and last stops unnumbered. The use of netting is advantageous when orders are large enough to facilitate proper separation on the truck.

Other Warehousing Improvements

In addition to work methods and equipment, many other factors influence the efficiency and productivity of the warehousing operation. Retailer cooperation is important in obtaining a more balanced work load in the warehouse and a more efficient delivery operation. Employee motivation and stability can be improved in many firms by "selling" the company to employees, holding meetings with employees, recognizing employee accomplishments through awards, and with the use of a suggestion award system to stimulate employee thinking toward economies in operation. A warehouse cost control program provides a means for measuring warehouse labor costs that gives a basis for improving the efficiency of warehouse labor.

Probably the best measure of the overall productivity of warehousemen is tons of merchandise handled per man-hour. Cases per man-hour provides a good measure of productivity of individual warehousemen and of such warehouse operations as car unloading, order selecting, checking, and loading.

This is not an attempt at modernistic photography. It is a close-up of a prototype "float-roll" apple sorting table developed through marketing research sponsored by the U. S. Department of Agriculture.

Fruit riding atop the rollers, which extend clear across the table, moves to the sorter turning over-and-over and around-and-around. Speed of movement of the fruit toward the sorters and the amount of rotation of the fruit during its forward travel are controllable. Further explanation of the table's operation is given below.

Float-Roll Sorting Table

By Joseph F. Herrick, Jr.

A "public-use" patent is being sought by the U. S. Department of Agriculture for a radically new type of sorting table. Developed for use in grading apples during the course of Department-sponsored marketing research in the Pacific Northwest, the new "float-roll" table, already commercially available, is more efficient and does the grading job more cheaply than equipment currently in use there. In addition, because of its greater capacity, the new type table increases the volume of fruit that can be packed daily and speeds up other apple packing operations.

Although it is designed primarily for use in apple grading, the new sorting table could be used for similar work on other fruits and vegetables or where visual inspection is required for other products. The new equipment was designed after many trials during the course of research by the Washington State Apple Commission under an Agricultural Marketing Act contract with USDA. The research work is administered by the Transportation and Facilities Branch of the Agricultural Marketing Service.

Previous Research

This AMA research work has developed many other items of equipment for use in apple packing houses. Included are a mechanical "high-piler" for stacking and breaking-out boxes, improved sizing equipment, return-flow belts for accumulating apples from sizing lines, an automatic box filler and a bagging chute, flat type apple cartons, an automatic case sealer and other equipment to reduce packing costs.

This view of the "float-roll" table shows the sorting lanes divided by metal rods extending the length of the table.

Here, rubber washers are used to divide the sorting lanes. Note cull disposal chute under sorter's left arm.

Description of Table

The "float-roll" table consists of a series of closely spaced rubber rollers which revolve as they move forward. Apples, which ride on top of the rollers, are rotated as they move forward to the sorters so that all the surface of the fruit is visible. Both the forward speed (translation) of the fruit to the sorters and the turning (rotation) of the fruit as it moves toward them are variable and can be controlled.

About a foot wider than any commercial sorting table now in use, the new equipment is divided into 6 sorting lanes on each side with an additional two lanes in the center which are used to "run-off" one of the grades of fruit that are being sorted. As can be seen in the close-up photograph above the title, there are alternative methods of dividing the table into lanes. In the foreground, the large, light-colored rubber washers perform this function. In the background small metal rods, extending the length of the table, are used for the same purpose.

Separating the wider center lanes of the table are the dark colored, rubber friction-wheels which contact a chain drive to rotate the rollers. The smaller rubber washers on the rollers, between the larger washers which divide the lanes, tend to throw apples off center so that they will not rest in one position and fail to rotate. (Researchers feel that a corrugated surface on the rollers, instead of the smooth rubber covering now used, might provide better rotation of the fruit, although accumulation of fruit wax on the smooth rollers minimizes this problem.

Operation of the Table

In Washington State, apples generally are sorted to 3 grades: "Extra Fancy", "Fancy", and culls. The "float-roll" sorting table receives the apples after they come from the washer. Fruit is deflected away from the two center lanes and on to the remaining 6 lanes on each side of the table. Graders are stationed on each side of the table, each responsible

This photograph was taken lengthwise down the "float-roll" table while it was in operation. Sorters, looking up the table, check the fruit approaching them in the lane for which they are responsible. Fancy Grade fruit is moved to the center lanes.

for one or two of the lanes. Fancy fruit is lifted from the lanes to the center lanes (as is shown in the illustrations at top of page 7). Extra Fancy grade is allowed to remain in the lanes. Both grades are run-off the end of the table separately into the sizing equipment. Culls are disposed of in chutes attached to the table beside each sorter (note right-hand photograph, top page 7) and go to a removal belt operating underneath the table.

Advantages of "Float-Roll" Table

Over 100 tests under commercial conditions revealed that the new table increased sorting efficiency about 17 percent over that of the most efficient grading table then in use (one which the researchers also developed). This was attributed to certain advantages of the "float-roll" table: 1. The single lanes established tempo and rhythm in sorting; 2. irregular motion of apples was eliminated; 3. the fruit was more easily seen on top of the rollers; 4. the light background of the rollers reduced eye strain; and 5. crowding of apples was avoided. In addition, the new table permitted a greater volume of fruit to be packed daily because of its increased capacity - 18 to 56 percent more than grading tables currently in use. Since sorting is the "pace setting" operation of the packing line, other packing operations are speeded up.

Experimental Plum Containers Reduce Marketing Costs

By Edmund J. Pilz, Goodloe Barry and Donald R. Stokes

New shipping containers which may permit substantial reductions in the cost of marketing fresh western plums have been developed and evaluated under a 3-year research program sponsored by the U. S. Department of Agriculture.

The new containers - fiberboard boxes - are cheaper than the standard 4-basket crate now in general use. They also require less packing labor and permit savings in loading costs in rail shipments. Although plum packing costs vary from year to year, estimated savings, based on packing and shipping tests last season, ranged from 19 to 30 cents a crate depending upon the type and design of the container used. (See Table 1 at end of article.)

Agricultural Marketing Act Research

Development and evaluation of the new experimental containers was undertaken by the California Grape and Tree Fruit League under USDA contracts authorized by the Agricultural Marketing Act of 1946. The Transportation and Facilities Branch, Agricultural Marketing Service, administered the work. The research included test shipments of plums in the new containers so that the arrival condition and acceptance of the plums by the trade in eastern markets might be compared with those of similar size, variety, maturity, and quality shipped in standard 4-basket crates under like transit conditions in the same freight car.

Highlights of the research are being released at the request of the California Grape and Tree Fruit League for consideration by plum growers and shippers who may be interested in experimenting commercially with the new containers during the coming 1955 season.

Container Manufacturer and Trade Cooperation

More than 30 experimental containers from a dozen cooperating manufacturers were screened in an effort to satisfy exacting requirements developed under the project. Plum growers and shippers also cooperated by using their fruit and plant facilities in the shipping and packing tests and by supplying technical experience in devising new methods of place-packing and loading the experimental containers.

Savings made possible by use of the new containers vary with the size of the plums packed. Costs of the new containers also differ accord-

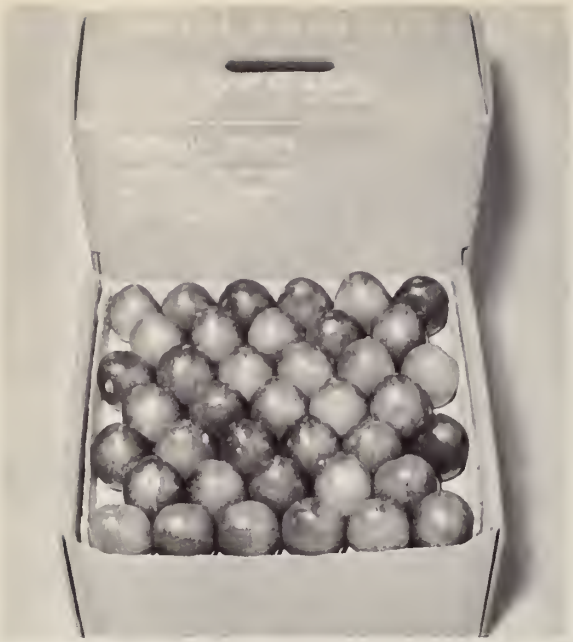

Figure 1.--Experimental Container 8B-29 - This sturdy 2-piece, full telescope container is packed with plums in symmetrical alignment in an inserted face tray. The telescope cover is in the background. Note handhold in cover which also serves as air vent. This container can be assembled completely by hand with neither staples nor glue necessary.

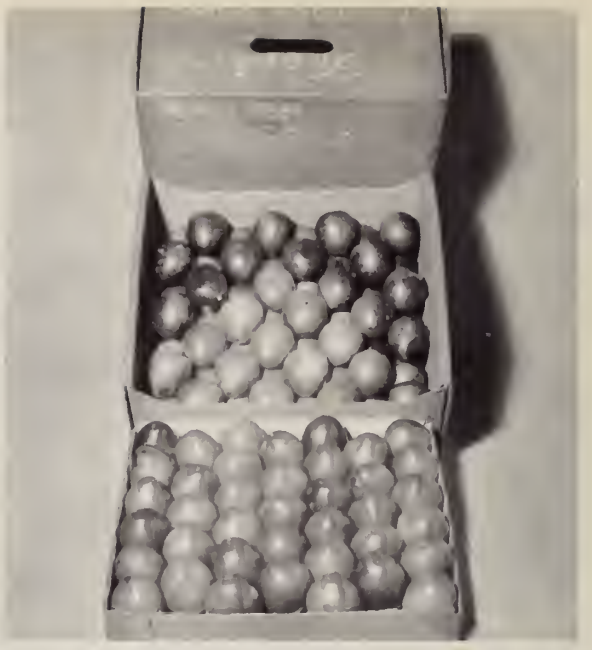

Figure 2.--Experimental Container 8B-29 Opened The face tray, which is stapled, has been removed to reveal orderly, snug fill attained through place-packing plums in lower part of container. Note cut-down front and rear sides of bottom half of container which eliminates appearance of slackness following the normal compaction of the fruit during transit.

ing to design and construction and amount and variety of color used in printing. As shown in Table 1, savings are largely possible because of the low cost of the new containers and expected lower packing labor costs. No specially designed packing lines were available for packing the experimental containers. Estimated costs of packing them were based upon limited studies and the judgment and industry experience of the researchers. Therefore, the data should be regarded as indicating the potential rather than actual savings.

Method of Packing Caused Concern

During the 1953 season, researchers had hoped for greater savings by devising a face-and-jumble-fill method of packing. However, these efforts were unsuccessful because a single-face pack became jumbled in shipment and a double-face did not leave enough room for an even fill that would assure a constant weight. The top layer of plums was then face-packed in a tray which maintained their alignment, making an attractive pack when opened for display. However, the weight of the plums in the tray caused excessive bruising of those plums on which the tray rested. Only a few of the plums in the jumble-fill pack supported the tray, so it became necessary to place-pack the plums to distribute the weight of the tray more uniformly on the plums below it. This increased the packing costs.

Cost of containers was also slightly increased due to the additional

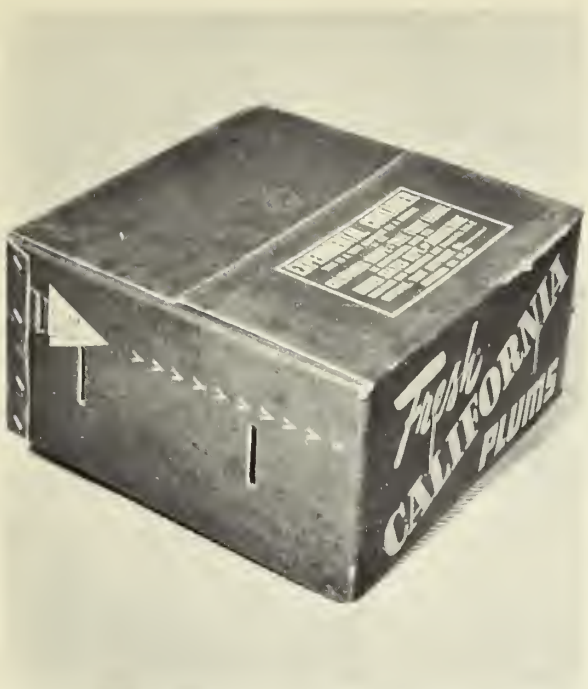

Figure 3.--Experimental Container 9B-25 - This is a regular slotted container with a tear-tape feature for opening for inspection of plums. The inspector or storekeeper simply grasps the triangular tab (left) and pulls, freeing top.

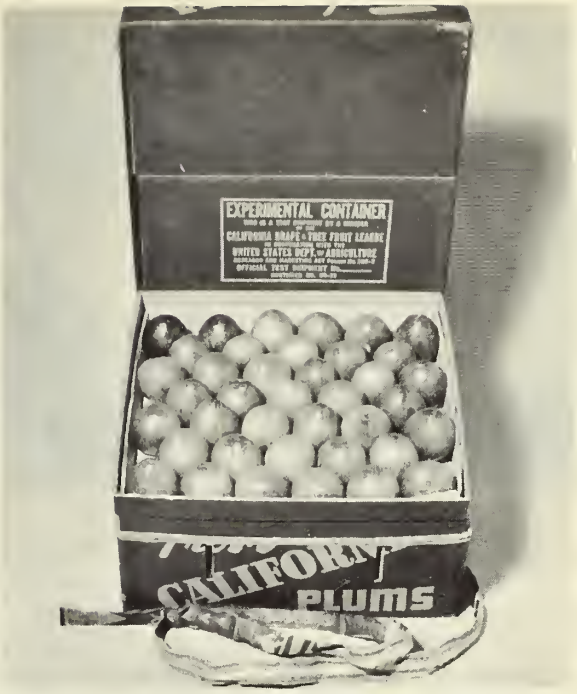

Figure 4.--Experimental Container 9B-25 Opened-Neat face-pack rests on equally orderly place-pack fill in bottom. Liner, perforated 1½-in. from top, normally is removed automatically with top, preventing appearance of slack.

cost of the tray and the use of sturdier containers. The stronger containers, which were developed and evaluated in 1954, were attractively printed in two colors to improve their general appearance.

Trade Acceptance Improves

Although more bruised plums were found in the experimental containers than in the standard crates, trade acceptance of the experimental containers improved appreciably last year. In 1953 auction buyers paid 1.2 cents per pound less for plums shipped in the experimental containers than they paid for plums shipped in standard crates. There was no appreciable price differential in 1954. Per package prices received for plums in 1954 were recorded at the New York and Chicago auctions for five replicated test shipments. By converting package prices to a pound basis, the researchers found that plums in the experimental containers sold for an average of 18.5 cents a pound in contrast with 18.4 cents a pound for comparable plums marketed in the standard 4-basket crates. Because marketing plums in experimental containers costs less, the estimated net return available to the shipper using the experimental containers was higher in 1954.

Five Containers Particularly Good

Three experimental containers given extensive tests in 1954 were found to perform quite satisfactorily under commercial conditions. Two

Figure 5.--Experimental Container 10B-23A - This full telescope model was the least expensive of the 5 experimental plum shipping containers developed by USDA research. It also has the lowest tare weight and is easy to open for inspection. The bottom is in the foreground and the top to the left, behind. Resting on cover is a tray for face packing.

other containers in which only limited shipments were made also performed well. No claim of all-around perfection is made for any container. Some excelled in some respects and some in others. Some pressure bruising was found in all containers. Additional attention should be given to this and to the problems of loading patterns and adequate refrigeration in railroad cars. Plum growers and shippers should consider their own requirements carefully in selecting experimental containers for any commercial trials they may wish to undertake.

All of the experimental boxes had inside dimensions of $12\frac{1}{2}$"x$12\frac{1}{2}$"x $6\frac{1}{2}$" or 7". The outstanding characteristics of the five containers which survived the exacting trials were as follows:

Experimental container 8B-29 (figs. 1 and 2) - A 2-piece folding full telescope box with roll ends which fold into place. Favorable characteristics: It is most liked by fruit buyers and auctioneers; has stapling and is easily made up by hand, making it especially suitable for smaller packing plants; has great stacking strength; is easily opened for inspection and has no appearance of slackness of pack, because sides of inner case are cut down. Unfavorable characteristics: It is relatively expensive and is unsuitable for automatic makeup or closing.

Experimental container 9B-25 (figs. 3 and 4) - A regular slotted container with full liner and tear tape feature for inspection opening. Favorable characteristics: Is sturdy; has no appearance of slackness of pack, because the top of an inner liner, $1\frac{1}{2}$ inches deep, is removed automatically with the top, and the fruit extends above the cut-down side; sells for a moderate price; can be mechanically sealed. Unfavorable characteristics: Opening for inspection defaces container and closing requires tape or stapling; liner must be inserted.

Experimental container 10B-23A (fig. 5) - A 2-piece full telescope box with inner and outer case of half-slotted design. Favorable characteristics: It has relatively low cost; is easily opened for inspection; can be mechanically set up and closed. Unfavorable characteristics: It is less sturdy than some of the other containers; bulges under certain stacking conditions, and slackness of pack is apparent at terminal market.

Experimental container 9B-24 - A half-slotted container with 2 inch top flaps turned out and down; full depth liner and 2-inch flap top cover fitting over container flaps. Favorable characteristics: It is sturdy;

has good appearance; is easy to open for inspection, but restapling is necessary to close; is easiest to load in full carlots, because spacers are not needed for ventilation, since side flaps on covers create air channels. Unfavorable characteristics: It is difficult to lid; must be set up prior to packing; and does not eliminate slack-pack appearance.

Experimental container 9B-28 - A 2-piece telescope box, inner and outer case of half-slotted design with partial liner; bottom $5\frac{1}{2}$ inches deep which supports $1\frac{1}{2}$-inch liner inside full-depth cover for total depth of 7 inches. Favorable characteristics: Its cost is low; it is adaptable of automatic sealing; presents full-pack appearance, because sides are reduced by $1\frac{1}{2}$ inches when cover containing $1\frac{1}{2}$-inch collar is removed. Unfavorable characteristics: It bulges under certain stacking conditions; must be case-sealed or hand-glued; strip liner must be inserted in full depth cover before packing.

Table 1.--Estimated comparative costs for packing and loading fresh plums marketed in experimental containers and in standard 4-basket crates, 1954

Item	Experimental containers (24.2 lbs. net)			Standard crate (28.6 lbs. net)
	10B-23A	9B-25	8B-29	
	Dollars	Dollars	Dollars	Dollars
Packing and loading costs:				
Container costs:				
Container	0.244	0.268	0.336	0.370
Pads, etc.	.030	.030	.030	.190
Assembly	.010	.010	.010	.020
Total container costs	.284	.308	.376	.580
Packing labor costs:				
Receiving, sorting and handling	.152	.152	.152	.180
Packing	.100	.100	.100	.160
Closure	.005	.005	.005	.010
Total packing labor costs	.257	.257	.257	.350
Loading costs:				
Materials	.013	.013	.013	.035
Labor	.037	.037	.037	.035
Total loading costs	.050	.050	.050	.070
Total packing and loading costs	.591	.615	.683	1.000
Cost per pound	.0244	.0254	.0282	.0350
Cost per 28.6 lbs. (crate equiv.)	.70	.73	.81	1.00
Savings in costs per crate equivalent by using experimental container	.30	.27	.19	-

Refrigeration Helps Fresh Peach Retailing

By William E. Lewis

Tree-ripened fresh peaches for retail sale at points distant from producing areas are one of the "dreams" of those interested in agricultural marketing. While this degree of marketing perfection may never quite be realized, recent marketing studies and developments in peach handling indicate that it is possible to retail riper, better dessert quality peaches than are now available in most consuming areas.

Meanwhile, retailers looking forward to better fresh peaches will be interested to know that recent research by the U. S. Department of Agriculture shows that refrigeration during display and overnight storage of the fruit in retail stores maintains quality and reduces losses.

During the fresh peach seasons of the past two years, the Biological Sciences Branch of the Agricultural Marketing Service sought to determine the effects of various retail-store display and handling methods on the quality of Elberta peaches. The studies were made at the Department's research center at Beltsville, Md., in a laboratory equipped with several types of display cases in which retail-store conditions could be simulated. Elberta peaches grown in Virginia and Pennsylvania were obtained from the Washington, D. C. wholesale produce market.

Operation of the Display Room

The peaches were sorted into representative lots before they were arranged on display racks. They were "displayed" about 7 inches deep from the front to the back of each rack. Approximately 75 peaches were used for each test. The peaches were displayed for 3 days as follows:

1. In a nonrefrigerated case continuously. A 6-foot wooden display case with galvanized metal bottom and sides was used for nonrefrigerated display. It was provided with a slatted rack, sloping towards the front. Distance from front to back of the case was 30 inches.

2. In a nonrefrigerated case during the daytime and in 32° and 40° Fahrenheit "walk-in coolers" at night. (The nonrefrigerated case was the same as the one previously described.) In the night storage rooms, temperatures were thermostatically controlled, and small fans were used to circulate the air. The relative humidity was approximately 85 percent.

3. In a 10-foot commercial, forced-air-circulation, mechanically refrigerated case continuously.

In each type of display case, one lot of peaches was sprinkled with tap water 4 times daily and a duplicate lot was not sprinkled. However, the nonsprinkled peaches held overnight in the refrigerated storage rooms became wet from condensed moisture when they were returned to the nonrefrigerated rack each morning. The display period began between 8 and 9 a.m. and ended between 6 and 7 p.m.

Temperatures of the produce on display were taken in the top and bottom layers at the front and back of the rack. The relative humidity in the display room during each of the 3-day testing periods averaged 54, 55, and 57 percent.

Results

The development of decay, bruising, ripening, softening, shriveling, and weight loss were factors of quality studied during the tests, which showed that:

Peaches displayed continuously without refrigeration decayed more rapidly than those held continuously in a mechanically refrigerated case or displayed on a nonrefrigerated rack during the daytime and held overnight in "walk-in coolers". At the end of 3 days, nonsprinkled and sprinkled peaches displayed continuously without refrigeration averaged 14 and 16 percent decay, respectively. Sprinkled peaches displayed during the daytime and held overnight in a 32°F room, averaged 6 percent decay while those in the continuously refrigerated lots averaged 3 percent or less. The decay was principally brown rot. Condensation of moisture on peaches moved from the "walk-in coolers" to display room temperatures (75° to 86°F) had no appreciable effect on the development of decay.

In these tests bruising and shriveling were of no importance under any of the various handling methods.

Nonrefrigerated peaches lost 9 and 7 percent (nonsprinkled and sprinkled, respectively) in weight, while those displayed in the mechanically refrigerated case and those stored at night in the "walk-in coolers" lost 4 percent or less. Nonsprinkled peaches lost slightly more weight than the sprinkled ones under each of the handling practices.

Ripening and softening progressed more rapidly in peaches held without refrigeration continuously. Peaches displayed in the mechanically refrigerated case remained firm the longest. No marked differences in softening were found in peaches held overnight in the 32° and 40°F rooms.

Conclusions

Refrigeration retarded ripening and development of decay. Peaches that have not yet reached a desirable stage of ripeness should not be refrigerated, but those that are ripe keep better in mechanically refrigerated display cases or when stored at night in "walk-in coolers" after daytime display in unrefrigerated cases.

Greatest loss in weight occurred in peaches displayed continuously

U. S. Department of Agriculture
Agricultural Marketing Service
Washington 25, D. C.

without refrigeration.

Moisture condensation due to changes in temperature from refrigerated night storage to room temperatures caused no appreciable deterioration. Sprinkling with tap water several times daily had no harmful effect, but no material advantage resulted from this practice.

☆U. S. GOVERNMENT PRINTING OFFICE 1955 O - 311819